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(71) Applicant: MOTOROLA, INC.  
Schaumburg, IL 60196 (US)

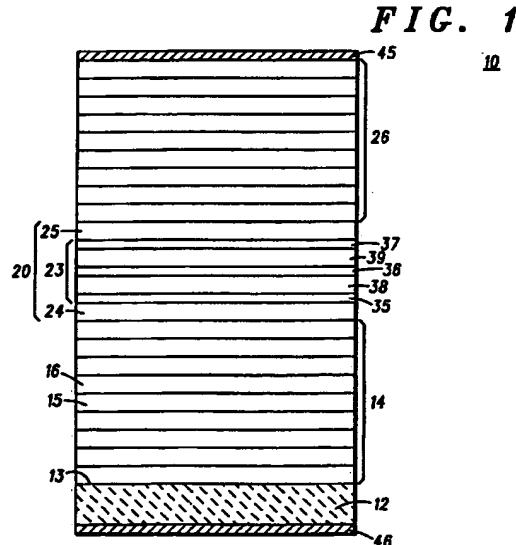
(72) Inventors:  
• Ramdani, Jamal  
Gilbert, Arizona, 85233 (US)

• Lebby, Michael S.  
Apache Junction, Arizona 85219 (US)  
• Jiang, Wenbin  
Phoenix, Arizona, 85044 (US)

(74) Representative:  
Williamson, Simeon  
Motorola European Intellectual  
Property Operations  
Midpoint  
Alencon Link  
Basingstoke, Hampshire RG21 7PL (GB)

### (54) Long wavelength VCSEL

(57) A VCSEL for emitting long wavelength light including a GaAs (111) substrate element (12), a first mirror stack (14) with mirror pairs in a GaAs/AlGaAs material system lattice matched to a GaInAsN active region (20) with an active structure (23) sandwiched between a first cladding region (24) adjacent the first mirror stack (14) and a second cladding region (25), the active structure (23) including a nitride based quantum well (35, 36, & 37), and a second mirror stack (26) lattice matched to the second cladding region (25) and having mirror pairs in a GaAs/AlGaAs material system.





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## EUROPEAN SEARCH REPORT

Application Number  
EP 98 10 6843

DOCUMENTS CONSIDERED TO BE RELEVANT					
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)		
Y	<p>T MIYAMOTO, T. TAKADA, ET AL: "Design and expected characteristics of 1.3 <math>\mu</math>m GaInNAs/GaAs vertical cavity surface emitting lasers" QUANTUM OPTOELECTRONICS 1997, TECHNICAL DIGEST SERIES, POSTCONFERENCE EDITION, , vol. 9, 19 - 21 March 1997, page 126-128 XP002075850 Incline Village NV USA * the whole document *</p> <p>US 5 383 211 A (VAN DE WALLE CHRIS ET AL) 17 January 1995 * column 5, line 19-39 *</p>	1-9	<p>H01S3/19 H01S3/085</p>		
Y		1-9			
A	<p>KONDOW M ET AL: "A NOVEL MATERIAL OF GAINAS FOR LONG-WAVELENGTH-RANGE LASER DIODES WITH EXCELLENT HIGH-TEMEPRATURE PERFORMANCE" INTERNATIONAL CONFERENCE ON SOLID STATE DEVICES AND MATERIALS, 21 August 1995, pages 1016-1018, XP000544869 * the whole document *</p> <p>EP 0 723 303 A (HEWLETT PACKARD CO) 24 July 1996 * the whole document *</p>	1-9	<p>TECHNICAL FIELDS SEARCHED (Int.Cl.6)</p> <p>H01S</p>		
A		1-9			
The present search report has been drawn up for all claims					
Place of search	Date of completion of the search	Examiner			
THE HAGUE	28 August 1998	Claessen, L			
CATEGORY OF CITED DOCUMENTS					
<p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>					